

Applicant : Robert E. Ray, Jr. et al.
Serial No. : 10/034,687
Filed : December 20, 2001
For : Electrochemical Cell Having Venting Current Collector and Seal Assembly

Art Unit: 1745
Examiner: Gregg Cantelmo

CLAIM AMENDMENTS

1. (currently amended) An electrochemical cell comprising:
a container having a bottom end and an open top end;
a positive electrode disposed in said container;
a negative electrode disposed in said container;
a seal member disposed in the open top end of said container for closing the open top end of said container, said seal member having an opening defined by an upstanding wall; and
a current collector having a shaft extending through the opening in said seal member and contacting one of the positive and negative electrodes, wherein the current collector is interference fit within the opening such that the upstanding wall of the seal member sealingly engages the shaft of the current collector when in a sealed position, and one of the upstanding wall of the seal member and current collector is axially movable relative to the other of the upstanding wall of the seal member and current collector to move to a vent position upon experiencing a predetermined pressure so as to provide a pressure relief passage between the ~~seam~~ upstanding wall of the seal member and the current collector to vent pressurized gases.
2. (original) The electrochemical cell as defined in claim 1, wherein said seal member and current collector form a collector and seal assembly.
3. (original) The electrochemical cell as defined in claim 1, wherein the current collector is forced to move along the upstanding wall of the seal member to a vent position to create the pressure relief passage.
4. (original) The electrochemical cell as defined in claim 3 further comprising an outer cover and a conductive connector electrically coupled to the current collector.
5. (original) The electrochemical cell as defined in claim 4 further comprising an inner cover, wherein the inner cover is electrically insulated from the outer cover.
6. (original) The electrochemical cell as defined in claim 4, wherein said conductive connector comprises a compressible coil spring.

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7. (original) The electrochemical cell as defined in claim 4, wherein said conductive connector comprises a bowl-shaped disk.

8. (original) The electrochemical cell as defined in claim 1, wherein said current collector includes an enlarged diameter step provided on the shaft, wherein the upstanding wall of the seal member moves along the shaft of the current collector and is retained by the enlarged diameter step in the sealed position, and wherein said upstanding wall of the seal member is forced to move over the enlarged diameter step to the vent position.

9. (original) The electrochemical cell as defined in claim 8, wherein said current collector includes a shaft having a first diameter sealingly engaging the upstanding wall of the seal member in the sealed position, and a second reduced diameter shaft that has a diameter less than the first diameter, wherein the upstanding wall of the seal member is forced to move towards the second reduced diameter to provide the pressure relief passage when the seal member is in the vent position.

10. (original) The electrochemical cell as defined in claim 8, wherein said current collector has one or more flutes formed therein for providing the pressure relief passage when in the vent position.

11. (original) The electrochemical cell as defined in claim 8, wherein said seal member includes a vent path provided on the top surface of the seal member to prevent resealing of the current collector and seal member when in the vent position.

12. (original) The electrochemical cell as defined in claim 8, wherein said seal member comprises polypropylene.

13. (original) The electrochemical cell as defined in claim 1, wherein said seal member comprises polymeric material.

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14. (original) The electrochemical cell as defined in claim 1, wherein said collector assembly and seal member sealingly engage each other following initial pressure venting.

15. (original) The electrochemical cell as defined in claim 1 further comprising an alkaline electrolyte.

16. (currently amended) An electrochemical cell comprising:

a container having a bottom end and an open top end;

a positive electrode disposed in said container;

a negative electrode disposed in said container;

a seal member disposed in the open top end of said container for closing the open top end of said container, said seal member having an opening defined by an upstanding wall in the seal member; and

a current collector having a shaft extending through the opening of the seal member and contacting one of the positive and negative electrodes, wherein the current collector is interference fit within the opening such that the seal member sealingly engages the shaft of the current collector when in a sealed position, wherein the current collector is forced to move within the opening of the seal member from a sealed position to a vent position upon experiencing a predetermined pressure so as to provide a pressure relief passage between the seam upstanding wall of the seal member and the current collector to vent pressurized gases.

17. (original) The electrochemical cell as defined in claim 16 further comprising an outer cover and a conductive connector electrically coupled to the current collector.

18. (original) The electrochemical cell as defined in claim 17, wherein said conductive connector comprises a compressible spring.

19. (original) The electrochemical cell as defined in claim 18, wherein the compressible spring is a coil.

20. (original) The electrochemical cell as defined in claim 17, wherein said conductive connector comprises a bowl-shaped disk.

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21. (original) The electrochemical cell as defined in claim 17, wherein said conductive connector biases the current collector towards the seal member.

22. (original) The electrochemical cell as defined in claim 16, wherein said seal member and current collector form a collector and seal assembly.

23. (original) The electrochemical cell as defined in claim 16 further comprising an alkaline electrolyte.

24. (currently amended) An electrochemical cell comprising:
a containing having a bottom end and an open top end;
a positive electrode disposed in said container;
a negative electrode disposed in said container;
a seal member disposed in the open top end of said container for closing the open top end of said container, said seal member having a central hub and an opening defined by an upstanding wall formed in the central hub; and
a current collector having a shaft extending through the opening of said seal member and contacting one of the positive and negative electrodes, wherein the current collector is interference fit within the opening such that the seal member sealingly engages the shaft of the current collector when in a sealed position, and the central hub of the seal member is forced to move along the shaft of the current collection from a sealed position to a vent position upon experiencing a predetermined pressure so as to provide a pressure relief passage between the ~~seam~~ upstanding wall of the seal member and the current collector to vent pressurized gases.

25. (original) The electrochemical cell as defined in claim 24, wherein the current collector includes an enlarged diameter step provided on the shaft, wherein the upstanding wall of the seal member moves along the current collector and is retained by the enlarged diameter step in the sealed position, and wherein the upstanding wall of the seal member is forced to move over the enlarged diameter step to the vent position.

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26. (original) The electrochemical cell as defined in claim 25, wherein the current collector includes a shaft having a first diameter sealingly engaging the upstanding wall of the seal member in the sealed position, and a second reduced diameter shaft that has a diameter less than the first diameter, wherein the seal member is forced to move towards the second reduced diameter shaft to provide the pressure relief passage when the seal member is in the vent position.

27. (original) The electrochemical cell as defined in claim 24, wherein the current collector includes one or more flutes formed therein for providing the pressure relief passage when in the vent position.

28. (original) The electrochemical cell as defined in claim 24, wherein said seal member includes a vent path provided on the top surface of the seal member to prevent resealing of the current collector and seal member when in the vent position.

29. (original) The electrochemical cell as defined in claim 24, wherein the seal member and current collector form a collector and seal assembly.

30. (original) The electrochemical cell as defined in claim 24 further comprising an alkaline electrolyte.

31. (original) The electrochemical cell as defined in claim 24, wherein said seal member comprises polypropylene.

32. (currently amended) A collector and seal assembly for sealing the open end of an electrochemical cell container, said collector and seal assembly comprising:

a seal member adapted to be disposed in an open end of a container to provide a sealed closure to the open end of the container, said seal member having an opening defined by an upstanding wall; and

a current collector having a shaft extending through the opening in said seal member, wherein the current collector is interference fit within the opening such that the upstanding wall of the seal member sealingly engages the shaft of the current collector when in a sealed position, and one of the upstanding wall of the seal member and current collector is forced to move axially

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relative to the other of the upstanding wall of the seal member and current collector to move to a vent position upon experiencing a predetermined pressure so as to provide a pressure relief passage between the ~~seam~~ upstanding wall of the seal member and the current collector to vent pressurized gases.

33. (original) The collector and seal assembly as defined in claim 32, wherein said seal member and current collector form a collector and seal assembly.

34. (original) The collector and seal assembly as defined in claim 32, wherein the current collector is forced to move along the upstanding wall of the seal member to a vent position to create the pressure relief passage.

35. (original) The collector and seal assembly as defined in claim 34 further comprising an outer cover and a conductive connector electrically coupled to the current collector.

36. (original) The collector and seal assembly as defined in claim 35, wherein said conductive connector comprises a compressible coil spring.

37. (original) The collector and seal assembly as defined in claim 35, wherein said conductive connector comprises a bowl-shaped disk.

38. (original) The collector and seal assembly as defined in claim 32, wherein said current collector includes an enlarged diameter step provided on the shaft, wherein the upstanding wall of the seal member moves along the shaft of the current collector and is retained by the enlarged diameter step in the sealed position, and wherein the upstanding wall of said seal member is forced to move over the enlarged diameter step to the vent position.

39. (original) The collector and seal assembly as defined in claim 38, wherein said current collector includes a shaft having a first diameter sealingly engaging the upstanding inner wall of the seal member in the sealed position, and a second reduced diameter shaft that has a diameter less than the first diameter, wherein the upstanding wall of the seal member is forced to move towards

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the second reduced diameter shaft to provide the pressure relief passage when the seal member is in the vent position.

40. (original) The collector and seal assembly as defined in claim 38, wherein said current collector includes one or more flutes formed therein for providing the pressure relief passage when in the vent position.

41. (original) The collector and seal assembly as defined in claim 38, wherein said seal member includes a vent path provided on the top surface of the seal member to prevent resealing of the current collector and seal member when in the vent position.

42. (original) The collector and seal assembly as defined in claim 38, wherein said seal member comprises polypropylene.

43. (original) The collector and seal assembly as defined in claim 32, wherein said seal member comprises polymeric material.

44. (original) The collector and seal assembly as defined in claim 32, wherein said collector assembly and seal member sealingly engage each other following initial pressure venting.